IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| **DECLARATION UNDER 37 C.F.R. §1.132** | ATTORNEY DOCKET NO. 70074.0001US01 | |
| | U.S. APPLICATION SERIAL NO. 09/880,322 | CONFIRMATION NO 5476 |
| | FILING DATE June 13, 2001 | |
| INVENTOR(S) Walter H. Runkis | EXAMINER S. Clardy | GROUP ART UNIT 1617 |
| TITLE OF APPLICATION COMPOSITION FOR TREATING CELLS AND METHOD FOR QUALITATIVELY AND QUANTITATIVELY CUSTOMIZING THE FORMULATION THEREOF | | |

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Cheng Wu, hereby declare as follows:

1. I received a BSc in Chemical Engineering in 1981. I served as a Product Development Manager in PVC from 1982 to 1986, and Fertilizer Sales Manager at Fintech Research Associates from 1993 to 1998.

2. I am currently President and Product Development Managers of GroWonders Corp., of Flushing, New York. My role is to develop new formulations and study their applications and compatibilities with other fertilizer ingredients. I have been employed at GroWonders since 1999; and

3. In order to explain technically why Woodhouse would have failed to have suggested or enabled one skilled in the art to practice the claimed invention and, in fact, would have taught away from the claimed invention, the following is provided below:

***a) Woodhouse Seeks To Adjust The Ratio of Fixed to Free Ammonia To Be Varied Over a Wide Range***

Woodhouse discloses that "by the use of sulfamic acid or salts of sulfamic acid as one constituent, nitrifying liquors can be obtained in which the ratio of fixed to free ammonia may be varied over a wide range." See col. 2, lines 30-34.

Furthermore, Woodhouse discloses that various phosphates may be added (col. 2, lines 37-38) and that:

The sulfamic acid or salts thereof may be added alone (as fixed ammonia containing material)... Col. 2, lines 41-42.

Thus, the "salts" described in Woodhouse are clearly ammonium-containing salts as the salts are typically added directly as ammonium sulfamate. See Examples 1 and 2.

However, it is clear that even free sulfamic acid added to the nitrifying or ammoniating liquors of Woodhouse would form ammonium sulfamate *in situ* by an acid-base reaction between the ammoniating – or nitrifying liquors and sulfamic acid.

It is also clear from the specification that either ammonium sulfamate is added directly (see Examples 1 and 2) or free sulfamic acid is added to "nitrogen-containing or ammoniating liquors generally to form ammonium sulfamate *in situ*." See col. 3, lines 46-59. However, any free sulfamic acid added would quickly be neutralized to form ammonium sulfamate.

### *b.* ***Woodhouse Teaches Away from the Use of Any Sulfamate Salts Other Than Ammonium Due to Metal Displacement by More Reactive Monovalent Ammonium***

As noted above, Woodhouse utilizes ammonium sulfamates either added directly or formed *in situ*.

Importantly, one skilled in the art would see no reason to use sulfamate salts other than ammonium sulfamate inasmuch as the addition of the nitrifying – or ammoniating liquors of Woodhouse to a sulfamate salt other than ammonium sulfamate, such as metallic sulfamate, would inevitably result in the formation of ammonium sulfamate by displacement of metal cation by ammonium cation.

In displacement reactions, such as a single displacement reaction, the more active element or cation displaces the less active element or cation. Moreover, the element displaced from a compound is always the more metallic element. See page 4 of 10 of http://www.chemistryexplained.com/Ce-Co/ chemical-reactions.html. (Copy attached to and incorporated herein). Thus, in the presence of the ammoniating liquor of Woodhouse, use of any sulfamate salts, would result in the formulation of ammonium sulfamate with release of the displaced metal cation into solution, thereby fundamentally

changing the composition, i.e., now devoid of metal. This would be detrimental to the composition of the present invention as the intended composition thereof (based upon the "determined deficiencies" in the plant medium) would thereby be altered, precluding the ability to correct the determined deficiencies.

Additionally, the inclusion of the nitrifying - or ammoniating liquors of Woodhouse would be detrimental to the reaction product used in accordance with the present invention due to this undesirable displacement reaction. Hence, the nitrifying - or ammoniating liquor are not used in the present composition, and, more importantly, cannot be.

### c. *In Addition to Metal Displacement By Ammonium cation, Precipitation Usually Occurs After Displacement*

In addition to displacement of metal cations from metal sulfamates by ammonium cations, precipitation usually results as a consequence of this displacement at the alkaline pH which inherently occurs in the mixtures of Woodhouse.

For example, in the presence of phosphates, displaced metal will form a displaced metal phosphate. Specifically, if iron is the displaced metal, iron phosphate will form and rapidly precipitate. Attached to and incorporated into this Declaration are Ksp values at 25 °C for various salts. Notably, iron phosphate with a Ksp value of $9.91 \times 10^{-16}$ is highly insoluble and will readily precipitate if an iron sulfamate "reaction product" of the present invention, for example, were subjected to one or more phosphates. Hence, for example, the present "reaction product" is incompatible with phosphates alone or in combination with other conventional additives such as sulfates.

Importantly, it is sufficient if a "free" metal cation is available for reaction/combination with phosphates or phosphate/sulfate mixtures as a function of Ksp. See http://www.ktf-split.hr/periodni/en/abc/kpt.html.

### *d.* ***The Present Macronutrient and/or Micronutrient-Adjusting Composition System is Not Compatible Generally With Many Conventional Fertilizer Systems***

The present composition is not compatible with Woodhouse as for the reasons indicated above. Generally, the present composition is, thus, intended to be used by itself as a complete system for correcting macronutrient- and/or micronutrient deficiencies in media for growing plants. For example, Example 4 of the present specification describes the inclusion of all sixteen (16) essential plant nutrients in a solution stable state.

4. Hence, in view of all of the above, one skilled in the art would be taught away from the present invention by Woodhouse. Additionally, the nitrifying - or ammoniating liquors of Woodhouse are fundamentally chemically incompatible with the claimed invention. Clearly, the claimed invention would not have been obvious to one skilled in the art at the time it was made in view of Woodhouse.

### *e.* ***Demonstration of How The Presently Claimed Composition is Easily Prepared With Software***

Attached to and incorporated into this Declaration is the single sheet entitled, "How To Turn Agro 575 Into Another NPK Ratio." This evidences how by using the present invention, one skilled in the art can precisely formulate a ready-to-use composition that provides exactly what a given crop demands.

Thus, even if the additional of a conventional fertilizer to the present composition did not result in an adverse chemical reaction, this addition would, nevertheless:

1. waste fertilizer, and
2. pollute the environment.

Hence, the addition of any conventional fertilizer would present these further problems as well.

*f.* ***The Reaction Compound of the Claimed Composition Avoids The Need for Additional Chelating Agents***

Furthermore, free metals are useless in the fertilizer industry as free metals are easily and readily bound by sulfates and phosphates, i.e., gypsum and iron phosphate, for example. In fact, sulfate readily displaces metals from sulfamates, i.e., in less then 1 hour at any pH. Hence, sulfates and sulfamates are chemically incompatible for purposes of the claimed invention.

In the micronutrient industry, free metals are chelated by chelating compounds, such as EDTA, DTPA, EDDHA, amino acids, citric acid, glucoheptonate or mannitol, for example, for use in fertilizers. One advantage of the present invention is that the claimed "reaction product" effectively sequesters metals without the need for added organic chelating compounds, such as those mentioned above.

All of the above further illustrates that the present composition is a self-contained macronutrient- and/or micronutrient adjusting composition which need not, and in many cases cannot be, used with other conventional fertilizer compositions.

*g.* ***Meaningfulness and Appropriateness of the Terms "Plant Growth Promoting Amount" of Nutrients and Water***

Attached to this Declaration is a Table from Horst Marschner's "Mineral Nutrition of Higher Plants." In essence, known average concentration of mineral nutrients in plant shoot dry matter are provided which are sufficient for growth. While these values are known, they vary considerably depending on plant species, plant age and concentration of other mineral elements. Thus, the term "plant growth promoting amount" is a meaningful and determinable amount.

The same is true for water as the amount would similarly depend upon determinable variables such as soil aridity, etc.

5. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title

18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

7-28-06
Date

Wu Ke Cheng
Cheng Wu

$2Fe(OH)_3\ (s) \rightarrow Fe_2O_3\ (s) + 3H_2O\ (g)$

Most oxoacids lose water until no hydrogen remains, leaving a nonmetal oxide:

$H_2SO_4\ (l) \rightarrow H_2O\ (g) + SO_3\ (g)$

Oxoanion salts that contain hydrogen ions break down into the corresponding oxoanion salts and oxoacids:

$Ca(HSO_4)_2\ (s) \rightarrow CaSO_4\ (s) + H_2SO_4\ (l)$

Finally, some ammonium salts undergo an oxidation–reduction reaction when heated. Common salts of this type are ammonium dichromate, ammonium permanganate, ammonium nitrate, and ammonium nitrite. When these salts decompose, they give off nitrogen gas and water.

$(NH_4)_2Cr_2O_7\ (s) \rightarrow Cr_2O_3\ (s) + 4H_2O\ (g) + N_2\ (g)$

$2NH_4NO_3\ (s) \rightarrow 2N_2\ (g) + 4H_2O\ (g) + O_2\ (g)$

Ammonium salts, which do not contain an oxidizing agent, lose ammonia gas upon heating:

$(NH_4)_2SO_4\ (s) \rightarrow 2NH_3\ (g) + H_2SO_4\ (l)$

# Single-Displacement Reactions

In a single-displacement reaction, a free element displaces another element from a compound to produce a different compound and a different free element. A more active element displaces a less active element from its compounds. These are all oxidation–reduction reactions. An example is the thermite reaction between aluminum and iron(III) oxide:

$2Al\ (s) + Fe_2O_3\ (s) \rightarrow Al_2O_3\ (s) + 2Fe\ (l)$

The element displaced from the compound is always the more metallic element—the one nearer the bottom left of the Periodic Table. The displaced element need not always be a metal, however. Consider a common type of single-displacement reaction, the displacement of hydrogen from water or from acids by metals.

The very active metals react with water. For example, calcium reacts with water to form calcium hydroxide and hydrogen gas. Calcium metal has an oxidation number of 0, whereas $Ca^{2+}$ in $Ca(OH)_2$ has an oxidation number of +2, so calcium is oxidized. Hydrogen's oxidation number changes from +1 to 0, so it is reduced.

$Ca\ (s) + 2H_2O\ (l) \rightarrow Ca(OH)_2\ (aq) + H_2\ (g)$

Some metals, such as magnesium, do not react with cold water, but react slowly with steam:

# How to Turn Agro 575 Into Another NPK Ratio

Some crops require specific quantities of NPK and calcium, maganesium and sulfur. Say you have NPK = 575 and wants NPK = 6-6.7-6.7 (nobody sells at 6.7%). The procedure is simple:

First go to **www.GroWonders.com** (requires Internet Explorer 5.5 or higher and disable pop up killers), press START (lower left side) and then select CALCULATOR. At the lower right side you will see the Premixed button, press the Arrow Down and select Agro 575. In the right field next to it, enter 1270 and press return. You get the guaranteed analysis with all the secondary macro and micro information on your left side. (calculator works with international units, gram, ml. --- 454 gram equals 1 lb = 16 oz; 1 gal = 3.875 liters, 1 tsp = 5 ml)

Second, add 50 (gram) of potassium nitrate in the Common Compounds area. Press return and see the new formulation 6-6.7-6.7 (see pic below). If you want to know the ppm and g/l at different dilutions, press the Proportioner button (middle left side).

If you have a fertilizer that is not listed in the Premixed field you can still change the macro proportions by first using the Common Compounds (enter amounts by trial and error) to derive the guaranteed analysis found in your fertilizer label and then add CMS and other fertilizer to reach a new formulation. It will make your new formulation closer to what your crop demands. ***WHY WASTE FERTILIZER? WHY POLLUTE THE ENVIRONMENT?***

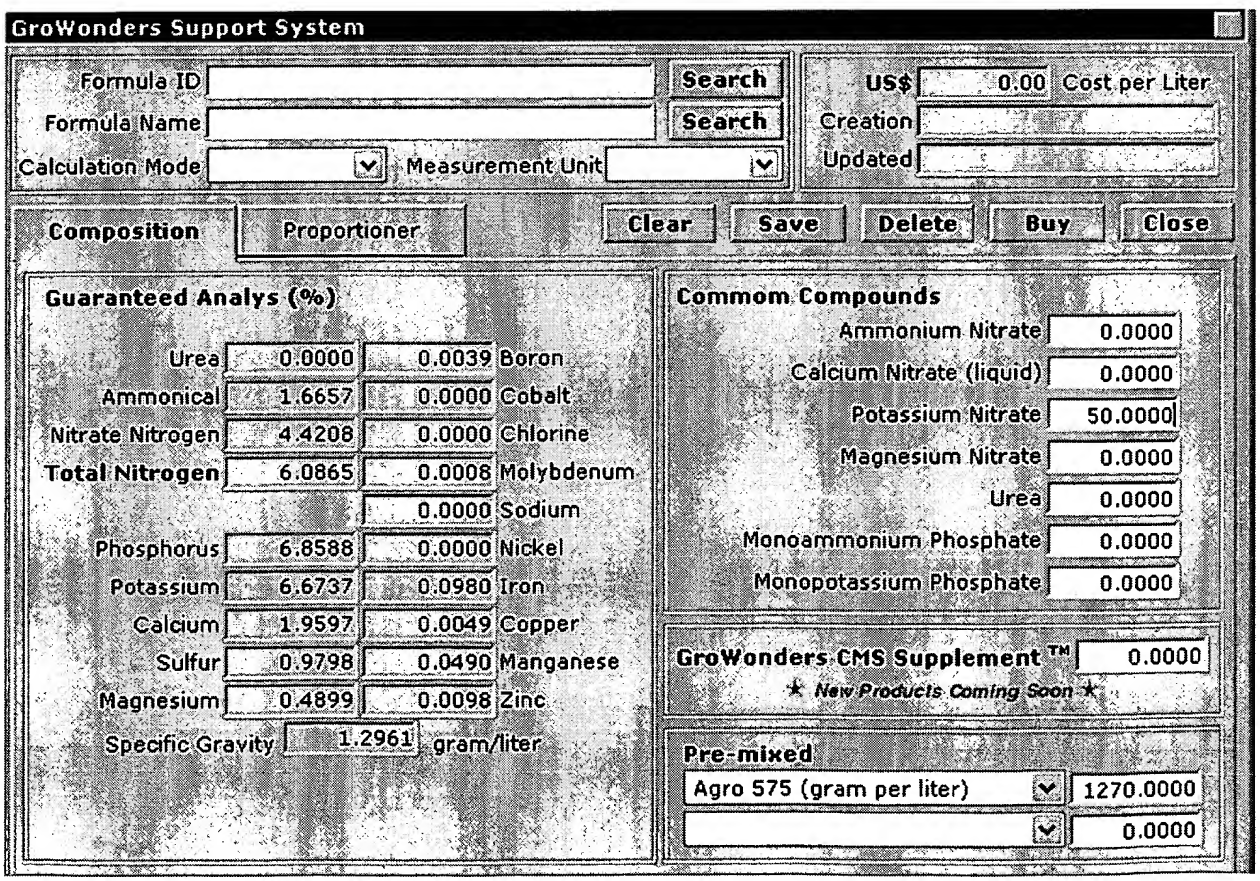

**Table 1.1**
Discovery of the Essentiality of Micronutrients for Higher Plants

| Element | Year | Discovered by |
|---|---|---|
| Iron | 1860 | J. Sachs |
| Manganese | 1922 | J. S. McHargue |
| Boron | 1923 | K. Warington |
| Zinc | 1926 | A. L. Sommer and C. B. Lipman |
| Copper | 1931 | C. B. Lipman and G. MacKinney |
| Molybdenum | 1938 | D. I. Arnon and P. R. Stout |
| Chlorine | 1954 | T. C. Broyer *et al.* |
| Nickel | 1987 | P. H. Brown *et al.* |

The term *essential mineral element* (or mineral nutrient) was proposed by Arnon and Stout (1939). These authors concluded that, for an element to be considered essential, three criteria must be met:

1. A given plant must be unable to complete its life cycle in the absence of the mineral element.
2. The function of the element must not be replaceable by another mineral element.
3. The element must be directly involved in plant metabolism – for example, as a component of an essential plant constituent such as an enzyme – or it must be required for a distinct metabolic step such as an enzyme reaction.

According to this strict definition those mineral elements which compensate for the toxic effects of other elements or which simply replace mineral nutrients in some of their less specific functions, such as maintenance of osmotic pressure, are not essential, but can be described as 'beneficial' elements (Chapter 10). It is still difficult to generalize when discussing which mineral elements are essential for plant growth. This is particularly obvious when higher and lower plants are compared (Table 1.2). For higher plants the essentiality of 14 mineral elements is well established, although the known requirement for chlorine and nickel is as yet restricted to a limited number of plant species.

**Table 1.2**
Essentiality of Mineral Elements for Higher and Lower Plants

| Classification | Element | Higher plants | Lower plants |
|---|---|---|---|
| Macronutrient | N, P, S, K, Mg, Ca | + | + (Exception: Ca for fungi) |
| Micronutrient | Fe, Mn, Zn, Cu, B, Mo, Cl, Ni | + | + (Exception: B for fungi) |
| Micronutrient and 'beneficial' element | Na, Si, Co | ± | ± |
| | I, V | — | ± |

Because of continuous improvements in analytical techniques, especially in the purification of chemicals, this list might well be extended to include mineral elements that are essential only in very low concentrations in plants (i.e., that act as micro-



the biosphere. The essentiality of these two mineral elements has been established for some higher plant species (Chapter 10). Most micronutrients are predominantly constituents of enzyme molecules and are thus essential only in small amounts. In contrast, the macronutrients either are constituents of organic compounds, such as proteins and nucleic acids, or act as osmotica. These differences in function are reflected in the average concentrations of mineral nutrients in plant shoots that are sufficient for adequate growth (Table 1.3). The values can vary considerably depending on plant species, plant age, and concentration of other mineral elements. This aspect is discussed in Chapters 8 to 10.

**Table 1.3**
Average Concentrations of Mineral Nutrients in Plant Shoot Dry Matter that are Sufficient for Adequate Growth[a]

| Element | Abbreviation | $\mu$mol g$^{-1}$ dry wt | mg kg$^{-1}$ (ppm) | % | Relative number of atoms |
|---|---|---|---|---|---|
| Molybdenum | Mo | 0.001 | 0.1 | — | 1 |
| Nickel[b] | Ni | ~0.001 | ~0.1 | — | 1 |
| Copper | Cu | 0.10 | 6 | — | 100 |
| Zinc | Zn | 0.30 | 20 | — | 300 |
| Manganese | Mn | 1.0 | 50 | — | 1 000 |
| Iron | Fe | 2.0 | 100 | — | 2 000 |
| Boron | B | 2.0 | 20 | — | 2 000 |
| Chlorine | Cl | 3.0 | 100 | — | 3 000 |
| Sulfur | S | 30 | — | 0.1 | 30 000 |
| Phosphorus | P | 60 | — | 0.2 | 60 000 |
| Magnesium | Mg | 80 | — | 0.2 | 80 000 |
| Calcium | Ca | 125 | — | 0.5 | 125 000 |
| Potassium | K | 250 | — | 1.0 | 250 000 |
| Nitrogen | N | 1000 | — | 1.5 | 1 000 000 |

[a] From Epstein (1965).
[b] Based on Brown *et al.* (1987b).